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Mark Watson — Mark Watson
By — Signature

Application No.	:	**10/775,371**
Confirmation No.	:	**9761**
Appellants	:	**TASHEV, et al.**
Title	:	**SELF-DESCRIPTIVE MICROPHONE ARRAY**
Filed	:	**February 9, 2004**
TC/A.U.	:	**2615**
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Customer No.	:	**27662**

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P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The subject application is assigned to Microsoft Corporation, of Redmond Washington.

II. RELATED APPEALS AND INTERFERENCES

There are no known related appeals or interferences.

III. STATUS OF CLAIMS

1. Claims 1 through 30 represent all claims currently pending in the application.

2. Claims 1 through 30 are rejected.

3. The rejection of claims 1 through 30 is hereby appealed.

IV. STATUS OF AMENDMENTS

No amendments are currently pending.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The pending patent application includes three independent claims: claims 1, 14, and 24. A summary of the subject matter claimed in each independent claim is provided below, with reference to specific page and line number of the specification and reference to specific elements of the drawings, as necessary.

a. Subject Matter of Independent Claim 1:

In general, as described in the specification of the present patent application (i.e., United States Patent Application Publication No. 2005 0175190 A1 (US Application No. 10/775,371)), the subject matter of claim 1 relates to a microphone array which includes an integral memory that contains parametric information which defines operational characteristics and configuration of the microphone array. When the claimed microphone array is connected to an external computing device via a connection interface, the microphone array provides this parametric information to the computing device. Sound processing software residing within the computing device then automatically performs all processing of audio signals captured by the microphone array in accordance with the parametric information reported to the external computing device by the microphone array.

More specifically, this claimed microphone array includes an integral memory that stores parametric information which defines operational characteristics and configuration of the array. For example, as illustrated by FIG. 3, the microphone array 300 includes parametric information 340. This parametric information is described throughout the specification of the present application. For example, paragraph [0060] of the present application addresses the issue of this parametric information with respect to FIG. 2 as follows:

> "[0060] In one embodiment, the parametric information stored in the microphone array memory module 230 is maintained in a lookup table which includes parametric information describing the configuration of the self-descriptive microphone array. In general, this lookup table, or other means of storage, includes one or more of the following elements of parametric information: 1) microphone array manufacturer, model, and version; 2) microphone types and position; 3) microphone array working volume (i.e., where the sound source is expected to be); 4) microphone gain calibration (inexpensive microphones and preamplifier combinations can have a +/- 4 dB gain difference due to manufacturing variance); and 5) speaker configuration for any speakers included in microphone array."

As noted above, the claimed microphone array also includes an interface for connection to an external computing device. For example, as illustrated by FIG. 2, this connection interface is represented by a microphone array input/output module 250 that provides a connection to the external computing device 290. This interface is described throughout the specification of the present application. For example, paragraph [0016] of the present application explains that the "...connection between the self-descriptive microphone array and the external computing device is accomplished using any of a variety of conventional wired or wireless computer interfaces, including, for example, serial, IEEE 1394, USB, IEEE 802.11, Bluetooth.TM., etc., to connect to the external computing device..."

Next, when the claimed microphone array is connected to the external computing device, the parametric information included in the memory is reported to the external computing device via the array interface. For example as illustrated by FIG. 4, following connection of the microphone array to the external computing device (see box 400 of FIG. 4), the parametric information is reported to the external computing device (see box 435 of FIG. 4).

Following reporting of the parametric information to the external computing device, the claimed microphone array transmits "audio signals captured by the microphone array... to the external computing device via the array interface..." (see box 445 of FIG. 4). The external computing device then performs "...all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device." This limitation is illustrated by box 440 of FIG. 4 which illustrates that audio processing software in the external computing device is configured immediately following reporting of the microphone array parametric information to the external computing device, and by box 445 of FIG. 4 which illustrates that the external computing device performs audio processing of the captured audio signals following configuration of the audio processing software residing in the external computing device.

These concepts relating to configuration of the audio processing software such that the captured audio signals are processed by the external computing device "in accordance with the parametric information reported to the external computing device" are described throughout the specification of the present application. For example, paragraph [0045] of the present application explains that "the device description of the self-descriptive microphone array is... automatically reported to an external computing device... to allow for automatic configuration of audio processing software residing within the external computing device for processing audio signals... captured by the self-descriptive microphone array..."

b. Subject Matter of Independent Claim 14:

In general, as described in the specification of the present patent application (i.e., United States Patent Application Publication No. 2005 0175190 A1 (US Application No. 10/775,371)), the subject matter of claim 14 relates to a method for automatically adapting audio processing software residing within an external computing device for optimally processing audio signals captured by a microphone array. This claimed method first automatically configures audio processing software operating within an external computing device to reflect a current configuration of a microphone array. This automatically configured software is then used within the external computing device to for processing audio signals captured by the microphone array and transmitted to the external computing device from the microphone array via a computer interface between the microphone array and the external computing device. Further, the microphone array automatically determines its current configuration at the time that it is coupled to the external computing device and then automatically reports that current configuration to the external computing device.

More specifically, the microphone array automatically determines its current configuration at the time that it is coupled to the external computing device. For example, as illustrated by FIG. 3, the microphone array 300 includes "self-calibration" capabilities 345 that are used to determine the current configuration of the microphone array. This "self-calibration" capability is described throughout the specification of the present application. For example, paragraph [0017] explains that "...in one embodiment, the self-descriptive microphone array includes an integral self-calibration system for automatically determining or evaluating at least some of the operational parameters of the microphones and associated preamplifiers comprising the self-descriptive microphone array..." Paragraph [0018] expands on this concept by explaining that "...the integral self-calibration system is capable of automatically determining one or more of the sensitivity and gain (i.e., magnitude and phase gains) of the individual channels (microphone plus preamplifier) of the individual channels (microphone plus preamplifier) in the self-descriptive microphone array."

As noted above, the claimed method also includes an interface for connecting the microphone array to an external computing device. For example, as illustrated by FIG. 2, this connection interface is represented by a microphone array input/output module 250 that provides a connection to the external computing device 290. This interface is described throughout the specification of the present application. For example, paragraph [0016] of the present application explains that the "...connection between the self-descriptive microphone array and the external computing device is accomplished using any of a variety of conventional wired or wireless computer interfaces, including, for example, serial, IEEE 1394, USB, IEEE 802.11, Bluetooth.TM., etc., to connect to the external computing device..."

Given this interface, when the claimed microphone array is connected to the external computing device, the configuration information automatically determined by the microphone array memory is reported to the external computing device via the array interface. For example as illustrated by FIG. 4, following connection of the microphone array to the external computing device (see box 400 of FIG. 4), the microphone array configuration information is reported to the external computing device (see box 435 of FIG. 4).

As noted above, given the microphone array configuration information reported to the external computing device, the claimed method automatically configures the audio processing software operating within the external computing device to reflect the current configuration of the microphone array. For example, box 440 of FIG. 4 illustrates that audio processing software in the external computing device is configured immediately following reporting of the microphone array parametric information to the external computing device. Further, paragraph [0045] of the present application explains that "the device description of the self-descriptive microphone array is... automatically reported to an external computing device... to allow for automatic configuration of audio processing software residing within the external computing device for processing audio signals... captured by the self-descriptive microphone array..."

This automatically configured software is then used within the external computing device to for processing audio signals captured by the microphone array and transmitted to the external computing device. For example, as illustrated by box 445 of FIG. 4, the microphone array transmits audio signals captured by the microphone array to the external computing device. The "...automatically configured audio processing software operating within the external computing device is used for processing audio signals captured by the microphone array and transmitted to the external computing device..." This limitation is illustrated by and by box 445 of FIG. 4 which illustrates that the external computing device performs audio processing of the captured audio signals following configuration of the audio processing software residing in the external computing device. Further, paragraph [0045] of the present application explains that "the device description of the self-descriptive microphone array is... automatically reported to an external computing device... to allow for automatic configuration of audio processing software residing within the external computing device for processing audio signals... captured by the self-descriptive microphone array..."

c. Subject Matter of Independent Claim 24:

In general, as described in the specification of the present patent application (i.e., United States Patent Application Publication No. 2005 0175190 A1 (US Application No. 10/775,371)), the subject matter of claim 24 relates to a system for automatically providing device configuration information (i.e. parametric information) of a microphone array to an external computing device. When the microphone array is connected to an external computing device via a computer interface, the microphone array provides the parametric information to the external computing device. Sound processing software residing within the computing device then automatically performs all processing of audio signals captured by the microphone array in accordance with the parametric information reported to the external computing device by the microphone array.

More specifically, the claimed system includes a microphone array (see element 300 of FIG. 3) that further includes at least one microphone (see elements 310 through

325 of FIG. 3). This microphone array further includes at least one addressable memory which stores the parametric information detailing device configuration information of the microphone array. For example, as illustrated by FIG. 3, the microphone array 300 includes parametric information 340. This parametric information is described throughout the specification of the present application. For example, paragraph [0060] of the present application addresses the issue of this parametric information with respect to FIG. 2 as follows:

> "[0060] In one embodiment, the parametric information stored in the microphone array memory module 230 is maintained in a lookup table which includes parametric information describing the configuration of the self-descriptive microphone array. In general, this lookup table, or other means of storage, includes one or more of the following elements of parametric information: 1) microphone array manufacturer, model, and version; 2) microphone types and position; 3) microphone array working volume (i.e., where the sound source is expected to be); 4) microphone gain calibration (inexpensive microphones and preamplifier combinations can have a +/- 4 dB gain difference due to manufacturing variance); and 5) speaker configuration for any speakers included in microphone array."

As noted above, the claimed microphone array also includes an interface for connection to an external computing device. For example, as illustrated by FIG. 2, this connection interface is represented by a microphone array input/output module 250 that provides a connection to the external computing device 290. This interface is described throughout the specification of the present application. For example, paragraph [0016] of the present application explains that the "...connection between the self-descriptive microphone array and the external computing device is accomplished using any of a variety of conventional wired or wireless computer interfaces, including, for example, serial, IEEE 1394, USB, IEEE 802.11, Bluetooth.TM., etc., to connect to the external computing device..."

Next, when the claimed microphone array is connected to the external computing device, the parametric information included in the addressable memory is automatically read by the microphone array and reported to the external computing device via the computer interface. For example as illustrated by FIG. 4, following connection of the microphone array to the external computing device (see box 400 of FIG. 4), the parametric information is reported to the external computing device (see box 435 of FIG. 4).

Following reporting of the parametric information to the external computing device, the microphone array transmits "...audio signals captured by the microphone array... to the external computing device..." (see box 445 of FIG. 4). The external computing device then performs "...all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device." This limitation is illustrated by box 440 of FIG. 4 which illustrates that audio processing software in the external computing device is configured immediately following reporting of the microphone array parametric information to the external computing device, and by box 445 of FIG. 4 which illustrates that the external computing device performs audio processing of the captured audio signals following configuration of the audio processing software residing in the external computing device.

These concepts relating to configuration of the audio processing software such that the captured audio signals are processed by the external computing device "in accordance with the parametric information reported to the external computing device" are described throughout the specification of the present application. For example, paragraph [0045] of the present application explains that "the device description of the self-descriptive microphone array is... automatically reported to an external computing device... to allow for automatic configuration of audio processing software residing within the external computing device for processing audio signals... captured by the self-descriptive microphone array..."

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

a. Independent claim 1 stands rejected under 35 U.S.C. §112, First Paragraph, as failing to comply with the written description requirement.

b. Independent claim 24 stands rejected under 35 U.S.C. §112, First Paragraph, as failing to comply with the written description requirement.

c. Independent claim 1 stands rejected under 35 U.S.C. §102(e) as being unpatentable over ***Arndt*** (US Patent 6,954,535).

d. Independent claim 14 stands rejected under 35 U.S.C. §102(e) as being unpatentable over ***Arndt*** (US Patent 6,954,535).

e. Independent claim 24 stands rejected under 35 U.S.C. §102(e) as being unpatentable over ***Arndt*** (US Patent 6,954,535).

VII. ARGUMENT

a. Rejection of Claim 1 under 35 U.S.C. §112, First Paragraph:

In the Final Office Action of May 9, 2008, claims 1-13 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Appellants respectfully traverse these rejections.

In particular, the Final Office Action suggests that claim 1 includes new matter not supported by the specification as originally filed by arguing:

> "...There is no specific text in the original disclosure as filed that explicitly states that the external computing device performing **all** audio processing of the captured audio signal calibration in accordance with the parametric information reported to

> the external computing device... One skilled in the art would also see that pre-amplifiers and the A/D converters also processed the captured audio signal based on the operational characteristic of the microphone array."

Similarly, in the Advisory Action dated July 28, 2008, the Examiner presents a corresponding argument by suggesting the following:

> "A/D converter is a part of the disclosure, and A/D converter is an element in one embodiment. The claims never exclude A/D converter from the claimed invention. The claims of the instant application are the type of the claims that could add additional elements, such as A/D converter, to the claims. So ***A/D converter could process the audio signal captured by the microphone array. A microphone captures audio signal. The claimed "audio signal captured by the microphone array" read on the signal immediately output by the microphone array. So preamps process the audio signal captured by the microphone array***..." (emphasis added)

First, in stark contrast to the arguments advanced by the Examiner, the claimed microphone array ***does pass or transmit audio signals captured by the microphone array to an external computing device for all audio processing of that audio data***. Further, this concept is ***clearly supported by the specification*** of the present application. For example, paragraph [0048] of the specification (US Patent Application Publication No. 2005-0175190 A1 (US Application No. 10/775,371)), describes this feature of the claimed microphone array as follows:

> "[0048] Consequently, because the ***self-descriptive microphone array makes use of external computing power, rather than including onboard audio processing hardware and software***, the self-descriptive microphone array is relatively inexpensive to manufacture in comparison to conventional microphone array devices that include onboard audio processing capabilities. Further, because ***external processing power is used for audio processing***, combined applications

such as, for example, adaptive beamforming combined with acoustic echo cancellation (AEC) can be easily performed without including expensive audio processing software and/or hardware within the array itself. Consequently, one major advantage of moving microphone array audio processing to an external computing device is that it enables conventional conferencing applications... to use microphone arrays such as the self-descriptive microphone array described herein while significantly reducing microphone array costs."

Next, as discussed in further detail below, in the claimed microphone array, neither A/D converters nor preamplifiers "process audio signal ***captured by the microphone array***..." Specifically, the preamplifiers comprise an integral part of the microphone array itself. As expressly defined in the specification (see further discussion below), the A/D converters are an ***optional*** component of the microphone array that is not claimed in independent claim 1, and thus should not be read into claim 1. However, in either case, as discussed below, these A/D converters are improperly considered by the Examiner in rejecting claim 1.

In particular, in various embodiments, the claimed microphone array includes ***optional*** A/D converters (element 335 of FIG. 3). Specifically, the A/D converters illustrated in FIG. 3 are an ***optional*** component (illustrated by the use of broken lines) that is not claimed in either claim 1. In particular, paragraph [0065] of the present application states that "...any boxes and interconnections between boxes that are ***represented by broken or dashed lines in either FIG. 3 or FIG. 4 represent alternate embodiments of the self-descriptive microphone array described herein***..." Further, paragraph [0068] of the present application explains that in "...a related embodiment, the array 305 further includes one or more Analog-to-Digital (A/D) converters 335 for digitizing an analog audio input from each microphone (310 through 325)..." Clearly, since the use of A/D converters is expressly ***optional***, and since such use is ***not claimed***, the A/D converters should not be considered in the present rejection.

However, as discussed in further detail below, even if the A/D converters are read into claim 1, as argued by the Examiner, those A/D converters would also be an integral part of the microphone array itself, along with the preamplifiers illustrated in FIG. 3. Thus, in the interpretation argued by the Examiner, the Microphone array includes microphones, preamplifiers, and A/D converters (see FIG. 3 of the present specification).

It is important to note that as discussed in further detail below, Appellants specifically claim that the audio signals are ***captured by the microphone array***, and not merely some portion of the claimed microphone array. Specifically, the A/D converters (element 335) and preamplifiers (element 330) illustrated in FIG. 3 are ***internal components*** of the microphone array (element 305), with the A/D converters (element 335) being ***optional*** internal components of the microphone array.

Thus, the claimed "***audio signals captured by the microphone array***..." must be interpreted as audio signals that are captured by the microphone array ***as a whole***, including each of the elements that together comprise the microphone array. Therefore, any audio signal ***captured by the microphone array***, as claimed, must be interpreted as originating from the ***output*** of the microphone array, as a whole, and not from particular elements that are internal to the microphone array. As such, the claimed ***audio processing*** is inherently ***subsequent*** to the claimed capture of audio signals performed by the microphone array.

In particular, inherent in the claimed ***audio capture*** process performed by the microphone array, pressure waves impinge upon the microphones ***integral to the microphone array***, which respond by generating electrical signals that are amplified by the preamplifiers ***integral to the microphone array*** to produce a ***captured audio signal***. Thus, the claimed microphone array captures audio signals by transforming pressure waves into electrical signals that are preamplified (and optionally digitized via the optional A/D converters), to generate the ***captured audio signals***, which represent the ***output*** of the microphone array.

As claimed, the ***captured audio signals*** are then transmitted from the microphone array, via the array interface, to the external computing device where all audio processing of that audio signal is performed. In particular, Appellants specifically claim that "...audio signals ***captured by the microphone array*** are transmitted from the microphone array to the external computing device via the array interface..." Clearly, this claimed limitation corresponds directly to FIG. 3, which clearly illustrates captured audio signals being transmitted from the microphone array (element 305) to the external computing device (element 290) via the microphone array interface (element 350).

In view of the preceding discussion, Appellants respectfully suggest that the Examiner's argument can be summarized as suggesting that the claimed ***audio signal capture*** performed by the claimed microphone array, which includes pre-amplification (and, according to the Examiner, optional A/D conversion), precludes the claimed ability to perform ***all*** processing of the captured audio signal using an external computing device. The Examiner further argues that such a claim is unsupported by the specification and drawings of the application as originally filed.

However, in view of the preceding discussion, it should be clear that since the claimed audio signals captured by the microphone array represent the ***output*** of the claimed microphone array, those captured audio signals ***are*** provided to the external computing device for ***all*** audio processing, as claimed. Appellants respectfully suggest that this interpretation of the claimed limitations is the only reasonable interpretation of claim 1 in view of the specific claim language, and in further view of the specification and drawings of the present application. Therefore, the argument advanced by the Office Action that pre-amplification inherent in the audio signal capture process precludes the ability to perform ***all*** audio processing using an external computing device is without support and must be withdrawn.

Consequently, it should be clear that there is absolutely no support for the assertion advanced by the Office Action that there "*...is no specific text in the original disclosure as filed that explicitly states that the external computing device performing **all** audio*

processing of the captured audio signal calibration in accordance with the parametric information reported to the external computing device..." In fact, as discussed above with respect to paragraph [0048] of the present application, the assertion advanced by the Office Action regarding external processing of audio data ***directly contradicts the specific teachings of the present specification***. As such, Appellants respectfully traverse the rejection of claim 1 under 35 U.S.C. §112, first paragraph.

b. Rejection of Claim 24 under 35 U.S.C. §112, First Paragraph:

In the Final Office Action of May 9, 2008, claims 24-30 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Appellants respectfully traverse these rejections.

In particular, the Final Office Action suggests that claim 24 includes new matter not supported by the specification as originally filed by arguing:

> "...There is no specific text in the original disclosure as filed that explicitly states that the external computing device performing **all** audio processing of the captured audio signal calibration in accordance with the parametric information reported to the external computing device... One skilled in the art would also see that pre-amplifiers and the A/D converters also processed the captured audio signal based on the operational characteristic of the microphone array."

Similarly, in the Advisory Action dated July 28, 2008, the Examiner presents a corresponding argument by suggesting the following:

> "A/D converter is a part of the disclosure, and A/D converter is an element in one embodiment. The claims never exclude A/D converter from the claimed invention. The claims of the instant application are the type of the claims that could add additional elements, such as A/D converter, to the claims. So ***A/D converter could process the audio signal captured by the microphone array***. ***A microphone***

> ***captures audio signal. The claimed "audio signal captured by the microphone array" read on the signal immediately output by the microphone array. So preamps process the audio signal captured by the microphone array...***" (emphasis added)

First, in stark contrast to the arguments advanced by the Examiner, the claimed microphone array ***does pass or transmit audio signals captured by the microphone array to an external computing device for all audio processing of that audio data***. Further, this concept is ***clearly supported by the specification*** of the present application. For example, paragraph [0048] of the specification (US Patent Application Publication No. 2005-0175190 A1 (US Application No. 10/775,371)), describes this feature of the claimed microphone array as follows:

> "[0048] Consequently, because the ***self-descriptive microphone array makes use of external computing power, rather than including onboard audio processing hardware and software***, the self-descriptive microphone array is relatively inexpensive to manufacture in comparison to conventional microphone array devices that include onboard audio processing capabilities. Further, because ***external processing power is used for audio processing***, combined applications such as, for example, adaptive beamforming combined with acoustic echo cancellation (AEC) can be easily performed without including expensive audio processing softeare and/or hardware within the array itself. Consequently, one major advantage of moving microphone array audio processing to an external computing device is that it enables conventional conferencing applications... to use microphone arrays such as the self-descriptive microphone array described herein while significantly reducing microphone array costs."

Next, as discussed in further detail below, in the claimed microphone array, neither A/D converters nor preamplifiers "process audio signal ***captured by the microphone array***..." Specifically, the preamplifiers comprise an integral part of the microphone array itself. As expressly defined in the specification (see further discussion below), the A/D

converters are an ***optional*** component of the microphone array that is not claimed in independent claim 24, and thus should not be read into claim 24.

In particular, in various embodiments, the claimed microphone array includes ***optional*** A/D converters (element 335 of FIG. 3). Specifically, the A/D converters illustrated in FIG. 3 are an ***optional*** component (illustrated by the use of broken lines) that is not claimed in either claim 24. In particular, paragraph [0065] of the present application states that "...any boxes and interconnections between boxes that are ***represented by broken or dashed lines in either FIG. 3 or FIG. 4 represent alternate embodiments of the self-descriptive microphone array described herein***..." Further, paragraph [0068] of the present application explains that in "...a related embodiment, the array 305 further includes one or more Analog-to-Digital (A/D) converters 335 for digitizing an analog audio input from each microphone (310 through 325)..." Clearly, since the use of A/D converters is expressly ***optional***, and since such use is ***not claimed***, the A/D converters cannot be considered in the present rejection.

However, as discussed in further detail below, even if the A/D converters are read into claim 24, as argued by the Examiner, those A/D converters would also be an integral part of the microphone array itself, along with the preamplifiers illustrated in FIG. 3. Thus, in the interpretation argued by the Examiner, the Microphone array includes microphones, preamplifiers, and A/D converters (see FIG. 3 of the present specification).

It is important to note that as discussed in further detail below, Appellants specifically claim that the audio signals are ***captured by the microphone array***, and not merely some portion of the claimed microphone array. Specifically, the A/D converters (element 335) and preamplifiers (element 330) illustrated in FIG. 3 are ***internal components*** of the microphone array (element 305), with the A/D converters (element 335) being ***optional*** internal components of the microphone array.

Thus, the claimed "***audio signals captured by the microphone array***..." must be interpreted as audio signals that are captured by the microphone array ***as a whole***,

including each of the elements that together comprise the microphone array. Therefore, any audio signal ***captured by the microphone array***, as claimed, must be interpreted as originating from the ***output*** of the microphone array, as a whole, and not from particular elements that are internal to the microphone array. As such, the claimed ***audio processing*** is inherently ***subsequent*** to the claimed capture of audio signals performed by the microphone array.

In particular, inherent in the claimed ***audio capture*** process performed by the microphone array, pressure waves impinge upon the microphones ***integral to the microphone array***, which respond by generating electrical signals that are amplified by the preamplifiers ***integral to the microphone array*** to produce a ***captured audio signal***. Thus, the claimed microphone array captures audio signals by transforming pressure waves into electrical signals that are preamplified (and optionally digitized via the optional A/D converters), to generate the ***captured audio signals***, which represent the ***output*** of the microphone array.

As claimed, the ***captured audio signals*** are then transmitted from the microphone array, via the computer interface, to the external computing device where all audio processing of that audio signal is performed. In particular, Appellants specifically claim that "...audio signals ***captured by the microphone array*** are transmitted from the microphone array to the external computing device via the computer interface..." Clearly, this claimed limitation corresponds directly to FIG. 3, which clearly illustrates captured audio signals being transmitted from the microphone array (element 305) to the external computing device (element 290) via the microphone array interface (element 350).

In view of the preceding discussion, Appellants respectfully suggest that the Examiner's argument can be summarized as suggesting that the claimed ***audio signal capture*** performed by the claimed microphone array, which includes pre-amplification (and, according to the Examiner, optional A/D conversion), precludes the claimed ability to perform ***all*** processing of the captured audio signal using an external computing device.

The Examiner further argues that such a claim is unsupported by the specification and drawings of the application as originally filed.

However, in view of the preceding discussion, it should be clear that since the claimed audio signals captured by the microphone array represent the ***output*** of the claimed microphone array, those captured audio signals ***are*** provided to the external computing device for ***all*** audio processing, as claimed. Appellants respectfully suggest that this interpretation of the claimed limitations is the only reasonable interpretation of claim 24 in view of the specific claim language, and in further view of the specification and drawings of the present application. Therefore, the argument advanced by the Office Action that pre-amplification inherent in the audio signal capture process precludes the ability to perform ***all*** audio processing using an external computing device is without support and must be withdrawn.

Consequently, it should be clear that there is absolutely no support for the assertion advanced by the Office Action that there "*...is no specific text in the original disclosure as filed that explicitly states that the external computing device performing **all** audio processing of the captured audio signal calibration in accordance with the parametric information reported to the external computing device...*" In fact, as discussed above with respect to paragraph [0048] of the present application, the assertion advanced by the Office Action regarding external processing of audio data ***directly contradicts the specific teachings of the present specification***. As such, Appellants respectfully traverse the rejection of claim 24 under 35 U.S.C. §112, first paragraph.

c. Rejection of Claim 1 under 35 U.S.C. §102(e):

In general, the Office Action rejected independent claim 1 under 35 USC §102(e) based on the rationale that the ***Arndt*** reference teaches the Appellants' claimed microphone array. However, in view of the following discussion, Appellants will show that the ***Arndt*** reference does not teach the Appellants claimed microphone array, and that the claimed microphone array is therefore patentable over the cited art.

In particular, the Office Action first suggests that the ***Arndt*** reference discloses the claimed limitation of "a memory contained within the array, said memory including parametric information which defines operational characteristics and configuration of the array." Specifically, the Office Action suggests that the "memory (21)" of the ***Arndt*** reference discloses this limitation with respect to col. 4, lines 16-19, of the ***Arndt*** reference.

Further, in the "*Response to Arguments*" section presented on page 7 of the final Office Action, the Examiner advances the argument that:

> "...applicant argued that Arndt fails to disclose the claimed memory and the external computing device performs all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device. This is not persuasive. Arndt clearly discloses that the memory (21) stored the filter parameters which define the operational characteristics and configuration of the microphone array. In col. 3, lines 46-50, Arndt discloses that the external computing device (9) processes the captured audio (through 18) in accordance with parametric information..."

First, as previously explained by the Appellants, the claimed microphone array specifically recites the limitation "...a ***memory*** contained within the array, said memory including ***parametric information which defines operational characteristics and configuration of the array***..."

In contrast, as admitted by the Office Action, "...Arndt clearly discloses that the memory (21) stored the filter parameters..." However, these filter parameters do ***not*** "...define the operational characteristics and configuration of the microphone array..." as argued by the Office Action. Specifically, the filter parameters described by the ***Arndt*** reference are computed by the ***external*** "measuring and evaluation unit 9" and are then transferred to the filters, and may be stored in the memory 21. In particular, col. 3, lines 37-42, of the ***Arndt*** reference recites the following:

> "The ***measuring and evaluation unit 9 calculates filter parameters*** from the registered directional diagram. These ***filter parameters, via the signal path 16, can be transferred to filters 4, 5 that can be parameterized*** and that are connected downstream with respect to the microphones 2, 3 of the hearing aid 1." (emphasis added)

Further, col. 4, lines 15-21, of the ***Arndt*** reference recites the following:

> "***Moreover, the filter parameters can be stored in an internal storage unit 21*** of the hearing aid 1 in the exemplary embodiment. Therefore, a number f sets of filter parameters, for different directional characteristics, can be stored and can be activated if required, for example, for adapting to different hearing situations." (emphasis added)

Therefore, it should be clear that the ***Arndt*** reference merely provides a teaching wherein particular filter characteristics ***for processing captured audio signals*** are computed by an external computing device. These filter parameters do ***not*** define "...***parametric information which defines operational characteristics and configuration of the array***..." as claimed. An example of the claimed parametric information is provided in paragraphs [0080] and [0081] of the present application as follows:

> "[0080] As noted above, a tested embodiment of the microphone array parametric information 340 is implemented as a lookup table using an EEPROM. An EEPROM or similar rewritable addressable memory is used in this embodiment to allow for updating of the lookup table, either in response to microphone array self-calibration, or in response to user adjustment of lookup table parameters from the external computing device via the microphone array interface."

> "[0081] As noted above, this lookup table generally includes one or more of 1) microphone array manufacturer, model, and version; 2) microphone types and

> position; 3) microphone array working volume (i.e., where the sound source is expected to be); 4) microphone gain calibration (note that nominally identical microphones can have on the order of a +/-4 dB gain difference due to manufacturing variances); and 5) speaker configuration for any speakers included in microphone array. Clearly, additional information may be included in the lookup table if it is available. For example, additional parametric information that may be useful for configuring particular audio processing software includes response functions for the microphones in the array; response functions for any speakers in the array; wave coefficient tables for each microphone or speaker, etc. When available, such information is included in the lookup table, and reported to the external computing device as described above."

In other words, the claimed microphone array includes a memory that specifically includes ***operational characteristics and configuration of the microphone array***, nothing more, and nothing less. Further, as claimed, the microphone array is used solely for ***capturing audio signals*** which are then transmitted to an external computing device, separate from the microphone array, in which all processing of audio data is performed. Thus, the "parametric information" must be interpreted to mean "***operational characteristics and configuration of the microphone array***" which describe audio capture characteristics of the microphone array.

In contrast, the ***Arndt*** reference discloses storage of filter parameters used by filters contained in the hearing aid to ***filter captured audio signals***. These filter parameters do ***not*** define operational parameters of ***Arndt's*** array of microphones (i.e., elements 2 and 3 of the hearing aid). Further, since the Office Action clearly treats the entire hearing aid of the ***Arndt*** reference as a "microphone array" for purposes of rejecting the claims, then it is clear that processing of audio data is performed ***within*** the hearing aid. As such, the ***Arndt*** reference fails to teach "***external computing device performing all audio processing of the captured audio signals***" as claimed. Note that this issue is addressed in further detail below.

Further, in the "*Response to Arguments*" section presented on page 7 of the Final Office Action, the Examiner advances the argument that:

> "...as shown in Fig. 2, the ***external computing device (9) processes the captured audio signal*** (through 18) ***in accordance with the inputs from 17 and 19 which are affected by the filter parameters*** (in 4 and 5) defining the operational characteristics of the array. As disclosed in col. 1 and col. 3, lines 45-46, Arndt's invention is to adjust the filter parameters, so the captured audio signal has a response that is closed to the desired ideal directional characteristic. Without inputs from 17 and 19, the external computing device cannot compare the captured audio with the processed audio signals (from 17 and 19) and determine the final filter parameter. The ***signals from 17 and 19 are the result of the signal processing based on the parametric information, so the signals from 17 and 19 include the parametric information defining the operational characteristics and configuration of the array***." (emphasis added)

In the Advisory Action, the Examiner further addresses this issue by presenting the following argument:

> "The filter coefficients read on the claimed parametric information which defines operation characteristics and configuration of the array. As stated in col. 4, lines 18-21, the coefficients are adapted for different hearing situations by changing the directivity of the microphone array. The filter coefficients are being retrieved for the filters (4, 5). See col. 3, lines 39-46. The filters define the directional characteristic of the hearing aid... ***It is irrelevant whether the filter coefficients are being calculated at an external device***." (emphasis added)

In other words, in both the Final Office Action and the Advisory Action, the Examiner argues that the audio signals captured by the microphones of the ***Arndt*** reference are filtered. The Examiner then argues that the filtered audio signals are provided to an external "measuring and evaluation unit." Thus, it should be clear that the Examiner

admits that the ***Arndt*** reference discloses ***providing filtered audio signals*** to a "***measuring and evaluation unit***." The Examiner then makes the ***erroneous and unsupported conclusion*** that the filter parameters are inherently reported to the "measuring and evaluation unit" of the ***Arndt*** reference since the filtered audio signal was ***processed*** "...***based on the parametric information***." The Examiner also then concludes that "***It is irrelevant whether the filter coefficients are being calculated at an external device***."

However, the claim limitation at issue is not whether filtered audio signals are provided to some other device, but that "a memory contained within the array..." includes "...***parametric information*** which ***defines operational characteristics and configuration of the array***..." that is "...reported to the external computing device..." Appellants respectfully suggest that sending ***filtered audio signals*** to a "***measuring and evaluation unit***," as disclosed by ***Arndt***, ***fails completely*** to support a teaching of ***reporting*** parametric information that ***defines operational characteristics and configuration of a microphone array*** to an external computing device. There is no equivalence between the two ideas.

Further, it should also be clear that the "measuring and evaluation unit" of the ***Arndt*** reference does ***not*** somehow attempt to reconstruct the filter parameters directly from the filtered audio signals. As such, the filter parameters are ***not*** reported to the "measuring and evaluation unit" by the hearing aid described by the ***Arndt*** reference. In fact, as previously explained by the Appellants, the "measuring and evaluation unit" of the ***Arndt*** reference ***computes and reports the filter parameters to the hearing aid*** – exactly the ***opposite*** of the argument advanced by the Office Action. Consequently, Appellants respectfully suggest that the statement regarding transmission of parametric information via the filter outputs of the ***Arndt*** reference is *completely without factual support and is in direct contradiction to the teachings of the* ***Arndt*** *reference*.

In particular, as explained above, col. 3, lines 37-42, of the ***Arndt*** reference teaches that the external computing device (i.e., "measuring and evaluation unit 9") computes the

filter parameters and ***transfers them to the filters***. Further, as explained in col. 3, lines 62-67 with respect to Figure 2 of the ***Arndt*** reference:

> "For calculating the filter parameters, ***the signals picked up by the microphones*** 2, 3, are tapped in the signal paths of the microphones 2, 3, preferably after the parameterizable filters 4 and 5, and ***are supplied to the measuring and evaluation unit 9 via a signal path 17***." (emphasis added)

In other words, the ***filtered*** audio output from the filters described by the ***Arndt*** reference is simply transmitted to the external "measuring and evaluation unit 9". Again, in contrast to the position advanced by the Office Action, ***transmission of a filtered audio signal to an external computing device*** as disclosed by the ***Arndt*** reference is simply ***not*** the same as the claimed limitation regarding reporting "...parametric information... to the external computing device... ***upon connection of the array to the external computing device***..."

Further, it should also be noted that the reporting of the parametric information to the external computing device, as claimed, occurs ***upon connection of the array to the external computing device***. In contrast, the hearing aid of the ***Arndt*** reference ***continuously*** transmits audio signals to the "measuring and evaluation unit 9" during operation of the hearing aid described by ***Arndt***. As such the limitation regarding ***when*** parametric information is reported is also not taught by the ***Arndt*** reference.

Further, it is also important to note that in the Advisory Action, the Examiner argues the following:

> "Arndt also teaches that some signal processing of the audio signal captured by the microphone array is performed at an external device. The paths 18, 17 and 19 all directed to an external device 9. The audio signal captured by the microphone array is directly applied to path 18, and the audio signal captured by the microphone array is indirectly applied to the paths 17 and 19. ***The claims do not state that the***

> ***information in the memory is being directly report to the external device***. The signal at path 17 or 19 include the filter coefficients because the signal at 17 or 19 is from the filters (4, 5) which are defined by the filter coefficients. If the input to filter 4 is X, and the coefficent is c1. Then the signal at path 17 is a function of both X and c1. So the parametric information, c1, is reported to the external device. It is irrelevant whether the signal is continuously being transmitted to the external device." (emphasis added)

In fact, in direct contrast to the position advanced by the Examiner, claim 1 does "***state that the information in the memory is being directly report to the external device***." In particular, claim 1 specifically recites "the ***parametric information included in the memory is reported to the external computing device*** via the array interface ***upon connection of the array to the external computing device***..." This language is both clear and unambiguous. As such, Appellants do not understand how the Examiner can argue that the parametric information is not directly reported to the external computing device.

With respect to the claimed limitation regarding transmission of the audio signals from the microphone array for processing, the Office Action suggests that Figure 2 of the ***Arndt*** reference "shows that the signals from microphones are transmitted to external computing device to be processed."

However, as carefully explained in each of the Appellants' prior responses, the specific claim limitation is that ***all*** processing of captured audio signals is performed by the external computing device. Appellants explained the advantages of such an array in comparison to one in which some of the audio processing is performed on-board (such as by the filters (4, 5) and the "signal processing unit" (6) of the ***Arndt*** reference which clearly process the captured audio signals before sending them to the "measuring and evaluation unit 9". Further, the Office Action suggested that the in view of the rejection under

In particular, Appellants specifically describe and claim the transmission of "audio signals captured by the microphone array… ***from the microphone array to the external computing device***…" which then performs "…***all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device***."

In contrast, as admitted by the Office Action, the ***Arndt*** reference discloses processing of audio signals ***within*** the hearing aid itself (e.g., filtering of audio signals). Thus, the ***Arndt*** reference simply does not teach the claimed limitation. Another example of the internal audio processing performed by the ***Arndt*** reference include the integral "signal processing unit **6**" of the hearing air (see FIG. 2 and col. 3, lines 50-67 of the ***Arndt*** reference) that processes sound signals recorded by the microphones (2 and 3) for playback via an integral speaker (i.e., "earphone **7**"). Clearly, the hearing aid device disclosed by the ***Arndt*** reference performs ***internal*** audio processing via both the filters and the integral "signal processing unit **6**". As such, the claimed microphone array is not disclosed by the ***Arndt*** reference.

Further, with respect to the issue of whether the claimed microphone array performs ***all*** audio processing of ***captured audio*** using an external computing device, Appellants respectfully suggest that the Office Action has incorrectly characterized the claimed microphone array. In fact, it should be clear that the external computing device ***does*** perform ***all*** audio processing of the audio signal captured by the microphone array, as disclosed and claimed by the Appellants.

In particular, as discussed above with respect to the rejections advanced by the Office Action under 35 U.S.C. §112, first paragraph, the claimed microphone array ***does pass or transmit all audio data captured by the microphone array to an external computing device for all audio processing of the captured audio data***. For example, paragraph [0048] of the specification (US Patent Application Publication No. 2005-0175190 A1 (US Application No. 10/775,371)), describes this feature of the claimed microphone array as follows:

> "[0048] Consequently, because the ***self-descriptive microphone array makes use of external computing power, rather than including onboard audio processing hardware and software***, the self-descriptive microphone array is relatively inexpensive to manufacture in comparison to conventional microphone array devices that include onboard audio processing capabilities. Further, because ***external processing power is used for audio processing***, combined applications such as, for example, adaptive beamforming combined with acoustic echo cancellation (AEC) can be easily performed without including expensive audio processing softeare and/or hardware within the array itself. Consequently, one major advantage of moving microphone array audio processing to an external computing device is that it enables conventional conferencing applications... to use microphone arrays such as the self-descriptive microphone array described herein while significantly reducing microphone array costs."

Clearly, in view of paragraph [0048], the present specification does provide support for the use of external processing of ***all*** audio data ***captured*** by the microphone array.

Further, with respect to FIG. 3, the Office Action suggests that based on the connections illustrated in FIG. 3, a person "... skilled in the art would also see that pre-amplifiers and the A/D converters also processed the captured audio signal based on the operational characteristic of the microphone array."

First, Appellants respectfully suggest that the A/D converters illustrated in FIG. 3 are an ***optional*** component (illustrated by the use of broken lines) that is not claimed in either claim 1 or claim 24. Therefore, this element cannot be considered as contributing to the conclusion that audio signals captured by the microphone are provided to an external computing device for all audio processing.

In particular, paragraph [0065] of the present application states that "...any boxes and interconnections between boxes that are ***represented by broken or dashed lines in either FIG. 3 or FIG. 4 represent alternate embodiments of the self-descriptive***

microphone array described herein..." Further, paragraph [0068] of the present application explains that in "...a ***related embodiment***, the array 305 ***further includes*** one or more Analog-to-Digital (A/D) converters 335 for digitizing an analog audio input from each microphone (310 through 325)..." Clearly, since the use of A/D converters is optional, and since such use is not claimed, the A/D converters cannot be considered in the present rejection.

Furthermore, with respect to the conclusion advanced in the Office Action that a person "... skilled in the art would also see that ***pre-amplifiers***... also processed the captured audio signal..." it is important to note that claim 1 recites the following limitation:

> "wherein ***audio signals captured by the microphone array*** are ***transmitted from the microphone array to the external computing device*** via the array interface, said ***external computing device performing all audio processing of the captured audio signals*** in accordance with the parametric information reported to the external computing device." (emphasis added)

In other words, the "***audio signals captured by the microphone array***" are transmitted to the external computing device which then performs all ***audio processing*** of the captured audio signal. In particular, inherent in the claimed ***audio capture*** process performed by the microphone array, pressure waves impinge upon the microphones ***included in the microphone array***, which respond by generating electrical signals that are amplified by the pre-amplifiers ***included in the microphone array*** to produce a ***captured audio signal***. Thus, the ***output*** of the microphone array is the ***captured audio signal***. The captured audio signal is then transmitted to the external computing device where ***all*** audio processing of that audio signal is performed.

Further, note that Appellants specifically claim "...***external computing device performing all audio processing of the captured audio signals***..." Thus, the audio processing being claimed is clearly ***subsequent to the capture process*** performed by the Microphone array, since that audio processing is performed on the ***captured*** audio signal.

As noted above, support for this embodiment of the claimed microphone array is provided in paragraph [0048] of the present application. Therefore, the argument advanced by the Office Action that pre-amplification inherent in the audio signal capture process precludes the ability to perform ***all*** audio processing using an external computing device is without support and must be withdrawn.

Therefore, in view of the preceding discussion, it is clear that independent claim 1 has elements not disclosed in the ***Arndt*** reference. Consequently, the rejection of claim 1 under 35 USC §102(e) is not proper. Therefore, Appellants respectfully traverse the rejection of claim 1, and of the claims dependent therefrom under 35 USC §102(e) in view of the language of claim 1. In particular, claim 1 recites the following novel language:

"A microphone array, comprising:

an array of at least one microphone;

a memory contained within the array, said ***memory including parametric information which defines operational characteristics and configuration of the array***;

an array interface for connecting the array to an external computing device;

wherein the ***parametric information included in the memory is reported to the external computing device*** via the array interface ***upon connection of the array to the external computing device***; and

wherein ***audio signals captured by the microphone array are transmitted from the microphone array to the external computing device*** via the array interface, said ***external computing device performing all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device***." (emphasis added)

d. Rejection of Claim 14 under 35 U.S.C. §102(e):

In general, in the Final Office Action, the Examiner rejected independent claim 14 under 35 USC §102(e) based on the rationale that the ***Arndt*** reference teaches the

Appellants' claimed method for "...automatically adapting audio processing software for optimally processing audio signals captured by a microphone array..." However, in view of the following discussion, Appellant will show that the ***Arndt*** reference does not teach the Appellants claimed method, and that the claimed method is therefore patentable over the cited art.

Further, as clearly argued in each of the Appellants prior responses, it must be noted that the Final Office Action addressed only the limitations of independent claim 1 while simply listing independent claim 14 in the preamble of the discussion regarding the rejection of claim 1. Claim 14 includes limitations that differ from those of claim 1. As such, Appellants respectfully suggest that the limitations of independent claim 14 have ***not*** been fully examined. Therefore, Appellants believe that the rejection of claim 14 is not supported and must be withdrawn. However, in the "*Response to Arguments*" section presented on pages 8 and 9 of the Final Office Action, several, but not all, of the arguments advanced by the Appellants for the patentability of claim 14 were addressed. Further, in the Advisory Action, the Examiner presented additional new arguments regarding the rejection of claim 14. As such, the Examiner rejected various elements of claim 14 in a piecemeal fashion, with part of the rejection being first advanced in the Final Office Action, and part of the rejection being first advanced in the Advisory Action following Appellants response to the Final Office Action. As such, Appellants submit that the rejection of claim 14 is not supported and must be withdrawn since ***no full rejection of all of the elements of claim 14 has yet been presented in any Office Acton***.

However, for purposes of completeness, Appellants first address several of the arguments presented by the Examiner in the Final Office Action in the "*Response to Arguments*" section regarding the patentability of claim 14. Appellants will then address the specific arguments presented by the Examiner with respect to independent claim 1 as they may or may not apply to independent claim 14. Finally, Appellants will address the new arguments presented for the first time in the Advisory Action with respect to independent claim 14.

In particular, on page 8 of the "*Response to Arguments*" section of the Final Office Action, first addressed Appellants arguments with respect to claim 14, by suggesting the following:

> "...applicant argued that Arndt fails to disclose the ***microphone array automatically determines the current configuration*** upon being coupled to the external computing device via the computer interface and the ***microphone array automatically reports the current configuration to the external computing device*** via the computer interface after the microphone array automatically determines the current configuration. This is not convincing. *Arndt clearly discloses that the current configuration is determined by the filters (4, 5)*. This is done automatically without any human intervention. Arndt also discloses that the invention is to adjust the microphone configuration, so the response is close to the idea response (col. 3, lines 44-46). *The signals 17 and 19 provide the external computing device the current configuration of the microphone array because signals 17 and 19 are defined by filters (4, 5)*. The filters (4, 5) define the current configuration. Any new configuration (defined by the filter coefficients) will be transferred to the memory after the external computing device made the calculation. ***The claim never specifies that the current configuration is directly transferred to the external computing device via the memory***." (emphasis added)

Appellants respectfully suggest that the above quoted argument mischaracterizes both the claimed method and the cited ***Arndt*** reference.

Specifically, the Office Action first states that "...Arndt clearly discloses that the current configuration is determined by the filters (4, 5)..." The filters of the ***Arndt*** reference do nothing except receive filter parameters and filter audio signals (see for example col. 3, lines 37-42, and FIG. 2 of the ***Arndt*** reference). As such, the ***Arndt*** reference does not disclose that "...the microphone array ***automatically determines the current configuration*** upon being coupled to the external computing device..." as claimed. In fact, the hearing aid of the ***Arndt*** reference ***never*** determines any self configuration

whatsoever. The described hearing aid simply receives filter parameters, sets the filters to use those parameters, and processes incoming audio data using those filters.

Further, as shown in the above-quoted text, the Office Action also advances the argument that "*...signals 17 and 19* ***provide the external computing device the current configuration of the microphone array*** *because signals 17 and 19 are defined by filters (4, 5)...*"

Clearly, this argument has no support whatsoever in the ***Arndt*** reference. In particular, the Office Action argues that the ***audio signals*** captured by the microphones of the ***Arndt*** reference are filtered "*...by filters (4, 5)...*" to produce filtered audio "*...signals 17 and 19...*" The Office Action then argues that the filtered audio signals are provided to the external "measuring and evaluation unit" described by the ***Arndt*** reference. Thus, it should be clear that the Office Action admits that the ***Arndt*** reference discloses ***providing filtered audio signals*** to a "***measuring and evaluation unit***." The Office Action then makes the ***erroneous and unsupported conclusion*** that the filter parameters are inherently reported to the "measuring and evaluation unit" of the ***Arndt*** reference since the filtered audio signal was ***processed*** "***...based on the parametric information***."

However, the claim limitations at issue are not that filtered audio signals are provided to some other device, but that the ***microphone array*** automatically ***determines the current configuration*** upon being coupled to the external computing device via the computer interface and that the microphone array then automatically ***reports the current configuration to the external computing device***. Appellants respectfully suggest that sending ***filtered audio signals*** to a "***measuring and evaluation unit***," as disclosed by ***Arndt***, ***fails completely*** to support a teaching of ***reporting*** the ***current configuration of the microphone array*** to an external computing device, ***after the microphone array automatically determines that configuration itself***. There is no equivalence between the two ideas.

Further, it should also be clear that the "measuring and evaluation unit" of the ***Arndt*** reference does ***not*** somehow attempt to reconstruct the filter parameters directly from the filtered audio signals. As such, the filter parameters are ***not*** reported to the "measuring and evaluation unit" by the hearing aid described by the ***Arndt*** reference. In fact, as previously explained by the Appellants, the "measuring and evaluation unit" of the ***Arndt*** reference ***computes and reports the filter parameters to the hearing aid*** – exactly the ***opposite*** of the argument advanced by the Office Action. Consequently, Appellants respectfully suggest that the statement regarding transmission of configuration information via the filter outputs of the ***Arndt*** reference is *completely without factual support and is in direct contradiction to the teachings of the* ***Arndt*** *reference*.

With respect to the arguments advanced with respect to claim 1 (where claim 14 was only listed in the preamble, without any direct treatment), the Office Action first suggests that the ***Arndt*** reference discloses "a memory (21) contained within the array, said memory including parametric information which defines operational characteristics and configuration of the array." Specifically, the Office Action suggests that the "memory (21)" of the ***Arndt*** reference discloses this limitation with respect to col. 4, lines 16-19, of the ***Arndt*** reference.

However, col. 4, lines 16-19, of the ***Arndt*** reference specifically explains that the memory (i.e., the "internal storage unit 21") merely includes different sets of filter parameters that can be activated for "adapting to different hearing situations..." Further, it is also clear that the filter parameters described by the ***Arndt*** reference are computed by the ***external*** "measuring and evaluation unit 9" and are then transferred to the filters, and may be stored in the memory 21. In particular, col. 3, lines 37-42, of the ***Arndt*** reference recites the following:

> "The ***measuring and evaluation unit 9 calculates filter parameters*** from the registered directional diagram. These ***filter parameters, via the signal path 16, can be transferred to filters 4, 5 that can be parameterized*** and that are

> connected downstream with respect to the microphones 2, 3 of the hearing aid 1." (emphasis added)

Further, col. 4, lines 15-21, of the ***Arndt*** reference recites the following:

> "***Moreover, the filter parameters can be stored in an internal storage unit 21*** of the hearing aid 1 in the exemplary embodiment. Therefore, a number f sets of filter parameters, for different directional characteristics, can be stored and can be activated if required, for example, for adapting to different hearing situations." (emphasis added)

In other words, the ***Arndt*** reference merely provides a teaching wherein particular filter characteristics ***for processing captured audio signals*** are computed by an external computing device. The ***Arndt*** reference then discloses that these externally computed filter characteristics can be stored in an internal memory of the "hearing aid" described by the ***Arndt*** reference.

In stark contrast, the Appellants do not specifically claim a "memory" that contains parametric information. Instead, Appellants specifically recite limitations wherein "...the ***microphone array automatically determines the current configuration upon being coupled to the external computing device*** via the computer interface..." Further, Appellants specifically claim that "...the microphone array ***automatically reports the current configuration to the external computing device*** via the computer interface ***after the microphone array automatically determines the current configuration***."

Neither of these two limitations is specifically addressed by the current rejections. However, in rejecting claim 1, the Office Action does state that the "***parametric information stored in the memory*** is being ***reported to the external computing device through the filter outputs***." However, Appellants respectfully suggest that this statement regarding transmission of parametric information via the filter outputs is completely without factual support and is in direct contradiction to the teachings of the ***Arndt*** reference.

In particular, as explained above, col. 3, lines 37-42, of the ***Arndt*** reference teaches that the external computing device (i.e., "measuring and evaluation unit 9") computes the filter parameters and ***transfers them to the filters***. Further, as explained in col. 3, lines 62-67 with respect to Figure 2 of the ***Arndt*** reference:

> "For calculating the filter parameters, ***the signals picked up by the microphones*** 2, 3, are tapped in the signal paths of the microphones 2, 3, preferably after the parameterizable filters 4 and 5, and ***are supplied to the measuring and evaluation unit 9 via a signal path 17***." (emphasis added)

In other words, the ***filtered*** audio output from the filters described by the ***Arndt*** reference is simply transmitted to the external "measuring and evaluation unit 9".

Clearly, in contrast to the position advanced by the Office Action, ***transmission of a filtered audio output to an external computing device*** as disclosed by the ***Arndt*** reference is simply ***not*** the same as the claimed limitations regarding automatically determining "...***the current configuration upon being coupled to the external computing device***..." and automatically reporting "...***the current configuration to the external computing device***..."

Finally, with respect to transmission of the audio signals from the microphone array to an external computing device for processing, in rejecting claim 1, the Office Action suggests that Figure 2 of the ***Arndt*** reference "shows that the signals from microphones are transmitted to external computing device to be processed."

However, as carefully explained in the Appellants prior response, claim 14 specifically recites limitations wherein audio processing software ***in an external computing device*** is ***automatically configured*** based on ***configuration information transmitted from the array*** to the external computing device. Then, that audio processing software in the external computing device is used to process the audio signals

captured by the microphone array. Specifically, claim 14 recites the following limitations with respect to this issue:

> "...automatically configure ***audio processing software operating within an external computing device*** to reflect a current configuration of a microphone array;
>
> said automatically configured audio processing software being used ***for processing audio signals captured by the microphone array***..."

Clearly, these elements provide advantages not disclosed or in any way anticipated by the cited ***Arndt*** reference. In fact, it should be noted that as discussed above, the filters described by the ***Arndt*** reference are configured in response to parameters sent by the ***measuring and evaluation unit*** into the hearing aid – exactly the ***opposite*** of what is argued by the Office Action.

In particular, the claimed method makes use of an ***external computing device*** for ***processing audio signals*** using ***automatically configured audio processing software*** in the external computing device that is configured based on configuration information sent by the microphone array to the external computing device.

In contrast, the ***Arndt*** reference discloses a "hearing aid" which includes an ***internal*** "signal processing unit 6" (see FIG. 2 and col. 3, lines 50-67 of the ***Arndt*** reference) that processes sound signals recorded by the microphones (2 and 3) for playback via integral an integral speaker (i.e., "earphone 7"), following filtering by the filters (4, 5) which are set using parameters sent by the measuring and evaluation unit (9) into the hearing aid. As such, the claimed method is not disclosed by the ***Arndt*** reference.

Finally, in the Advisory Action, the Examiner attempted to address several of the concerns raised by the Appellants by arguing the following:

> "For claim 14, the filter coefficients are supplied to filters 4 and 5 automatically. ***The signals at path 17 and 19 inform the external device what the current configuration is. So the microphone arrays automatically determines the current configuration upon being coupled to the external computing device.*** According to definition, "determine" means to settle or to end, so the filters automatically settle to the filter coefficients supplied from the memory. Since the signals at paths 17 and 19 are function of both the audio signal captured by the microphone and the filter coefficients at the filters (4, 5), the current configuration is reported to the external device through signals at paths 17 and 19." (emphasis added)

Clearly, the above quoted argument is circular in nature and fails completely to support the point being made. In particular, Appellants respectfully suggest that the Examiner's newest argument, first presented in the Advisory Action, can be restated as follows:

> *The hearing aid of the Arndt reference sends filtered audio data to the external computing device after filtering the audio data using filter parameters automatically supplied to filters 4 and 5 by the external computing device. Therefore, the hearing aid automatically determines its own configuration when it is connected to the external computing device.*

Clearly, this position advanced by the Examiner is wholly without support. In fact, as repeatedly explained by Appellants, and as discussed in detail above, the "signals at path 17 and 19" simply do ***not*** inform the external computing device of the current configuration of the microphone array since those signals are simply the filtered audio data that is sent to the external computing device following filtering within the hearing aid ***using the parameters reported to the hearing aid by the external computing device***. Further, since the hearing aid uses the parameters sent ***from*** the external computing device to hearing aid to configure the filter, the hearing aid does ***not determine its own configuration***. In fact, the hearing aid of the Arndt reference merely configures itself

based on some filter parameters that are instead determined by the external computing device and reported to the hearing aid.

Therefore, in view of the preceding discussion, it is clear that independent claim 14 has elements not disclosed in the ***Arndt*** reference. Consequently, the rejection of claim 14 under 35 USC §102(e) is not proper. Therefore, Appellants respectfully traverse rejection of claim 14 and the claims dependent therefrom under 35 USC §102(e) in view of the language of claim 14. In particular, claim 14 recites the following novel language:

> "A ***method for automatically adapting audio processing software for optimally processing audio signals captured by a microphone array***, comprising using a computing device to:
>
> automatically configure ***audio processing software operating within an external computing device*** to reflect a current configuration of a microphone array;
>
> said automatically configured audio processing software being used for processing audio signals captured by the microphone array;
>
> said microphone array including at least one microphone, and said microphone array being coupled to the external computing device via any of a wired and a wireless computer interface;
>
> wherein the ***microphone array automatically determines the current configuration*** upon being coupled to the external computing device via the computer interface; and
>
> wherein the microphone array ***automatically reports the current configuration*** to the external computing device via the computer interface ***after the microphone array automatically determines the current configuration***." (emphasis added)

e. Rejection of Claim 24 under 35 U.S.C. §102(e):

In general, in the Final Office Action, the Examiner rejected independent claim 24 under 35 USC §102(e) based on the rationale that the ***Arndt*** reference teaches the Appellants' claimed system for "...automatically providing device configuration information of a microphone array to an external computing device..." However, in view of the following discussion, Appellant will show that the ***Arndt*** reference does not teach the Appellants claimed system, and that the claimed system is therefore patentable over the cited art.

In particular, in the Final Office Action, the Examiner first suggests that the ***Arndt*** reference discloses "a memory contained within the array, said memory including parametric information which defines operational characteristics and configuration of the array." Specifically, the Office Action suggests that the "memory (21)" of the ***Arndt*** reference discloses this limitation with respect to col. 4, lines 16-19, of the ***Arndt*** reference.

Further, in the "*Response to Arguments*" section presented on page 7 of the Final Office Action, the Examiner advances the argument that:

> "...applicant argued that Arndt fails to disclose the claimed memory and the external computing device performs all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device. This is not persuasive. Arndt clearly discloses that the memory (21) stored the filter parameters which define the operational characteristics and configuration of the microphone array. In col. 3, lines 46-50, Arndt discloses that the external computing device (9) processes the captured audio (through 18) in accordance with parametric information..."

First, as previously explained by the Appellants, the claimed system specifically recites the limitation "...at least one ***addressable memory***, said addressable memory

storing parametric information ***detailing device configuration information*** of the microphone array..."

In contrast, as admitted by the Office Action, "...Arndt clearly discloses that the memory (21) stored the filter parameters..." However, these filter parameters do ***not*** "...define the operational characteristics and configuration of the microphone array..." as argued by the Office Action. Specifically, the filter parameters described by the ***Arndt*** reference are computed by the ***external*** "measuring and evaluation unit 9" and are then transferred to the filters, and may be stored in the memory 21. In particular, col. 3, lines 37-42, of the ***Arndt*** reference recites the following:

> "The ***measuring and evaluation unit 9 calculates filter parameters*** from the registered directional diagram. These ***filter parameters, via the signal path 16, can be transferred to filters 4, 5 that can be parameterized*** and that are connected downstream with respect to the microphones 2, 3 of the hearing aid 1." (emphasis added)

Further, col. 4, lines 15-21, of the ***Arndt*** reference recites the following:

> "***Moreover, the filter parameters can be stored in an internal storage unit 21*** of the hearing aid 1 in the exemplary embodiment. Therefore, a number f sets of filter parameters, for different directional characteristics, can be stored and can be activated if required, for example, for adapting to different hearing situations." (emphasis added)

Therefore, it should be clear that the ***Arndt*** reference merely provides a teaching wherein particular filter characteristics ***for processing captured audio signals*** are computed by an external computing device. These filter parameters do ***not*** define "...***parametric information which defines operational characteristics and configuration of the array***..." as claimed. An example of the claimed parametric

information is provided in paragraphs [0080] and [0081] of the present application as follows:

> "[0080] As noted above, a tested embodiment of the microphone array parametric information 340 is implemented as a lookup table using an EEPROM. An EEPROM or similar rewritable addressable memory is used in this embodiment to allow for updating of the lookup table, either in response to microphone array self-calibration, or in response to user adjustment of lookup table parameters from the external computing device via the microphone array interface."
>
> "[0081] As noted above, this lookup table generally includes one or more of 1) microphone array manufacturer, model, and version; 2) microphone types and position; 3) microphone array working volume (i.e., where the sound source is expected to be); 4) microphone gain calibration (note that nominally identical microphones can have on the order of a +/-4 dB gain difference due to manufacturing variances); and 5) speaker configuration for any speakers included in microphone array. Clearly, additional information may be included in the lookup table if it is available. For example, additional parametric information that may be useful for configuring particular audio processing software includes response functions for the microphones in the array; response functions for any speakers in the array; wave coefficient tables for each microphone or speaker, etc. When available, such information is included in the lookup table, and reported to the external computing device as described above."

In other words, the claimed system includes a memory that specifically includes ***parametric information detailing device configuration information of the microphone array, nothing more***, and nothing less. Further, as claimed, the microphone array is used for ***capturing audio signals*** which are then transmitted to an external computing device, separate from the microphone array, in which all processing of audio data is performed. Thus, the "parametric information" must be interpreted to mean "***device configuration***

information of the microphone array" which describes audio capture characteristics of the microphone array.

In contrast, the ***Arndt*** reference discloses storage of filter parameters used by filters contained in the hearing aid to ***filter captured audio signals***. These filter parameters do ***not*** define operational parameters of ***Arndt's*** array of microphones (i.e., elements 2 and 3 of the hearing aid). Further, since the Office Action clearly treats the entire hearing aid of the ***Arndt*** reference as a "microphone array" for purposes of rejecting the claims, then it is clear that processing of audio data is performed ***within*** the hearing aid. As such, the ***Arndt*** reference fails to teach "***external computing device performing all audio processing of the captured audio signals***" as claimed. Note that this issue is addressed in further detail below.

Further, in the "*Response to Arguments*" section presented on page 7 of the Final Office Action, the Examiner advances the argument that:

> "...as shown in Fig. 2, the ***external computing device (9) processes the captured audio signal*** (through 18) ***in accordance with the inputs from 17 and 19 which are affected by the filter parameters*** (in 4 and 5) defining the operational characteristics of the array. As disclosed in col. 1 and col. 3, lines 45-46, Arndt's invention is to adjust the filter parameters, so the captured audio signal has a response that is closed to the desired ideal directional characteristic. Without inputs from 17 and 19, the external computing device cannot compare the captured audio with the processed audio signals (from 17 and 19) and determine the final filter parameter. The ***signals from 17 and 19 are the result of the signal processing based on the parametric information, so the signals from 17 and 19 include the parametric information defining the operational characteristics and configuration of the array***." (emphasis added)

In the Advisory Action, the Examiner further addresses this issue by presenting the following argument:

> "The filter coefficients read on the claimed parametric information which defines operation characteristics and configuration of the array. As stated in col. 4, lines 18-21, the coefficients are adapted for different hearing situations by changing the directivity of the microphone array. The filter coefficients are being retrieved for the filters (4, 5). See col. 3, lines 39-46. The filters define the directional characteristic of the hearing aid... ***It is irrelevant whether the filter coefficients are being calculated at an external device***." (emphasis added)

In other words, in both the Final Office Action and the Advisory Action, the Examiner argues that the audio signals captured by the microphones of the ***Arndt*** reference are filtered. The Examiner then argues that the filtered audio signals are provided to an external "measuring and evaluation unit." Thus, it should be clear that the Examiner admits that the ***Arndt*** reference discloses ***providing filtered audio signals*** to a "***measuring and evaluation unit***." The Office Action then makes the ***erroneous and unsupported conclusion*** that the filter parameters are inherently reported to the "measuring and evaluation unit" of the ***Arndt*** reference since the filtered audio signal was ***processed*** "...***based on the parametric information***."

However, the claim limitation at issue is not whether filtered audio signals are provided to some other device, but that an "... addressable memory storing parametric information detailing device configuration information of the microphone array..." wherein the microphone array "... reports the parametric information to the external computing device via a computer interface..." Appellants respectfully suggest that sending ***filtered audio signals*** to a "***measuring and evaluation unit***," as disclosed by ***Arndt***, ***fails completely*** to support a teaching of ***reporting*** parametric information that ***defines operational characteristics and configuration of a microphone array*** to an external computing device. There is no equivalence between the two ideas.

Further, it should also be clear that the "measuring and evaluation unit" of the ***Arndt*** reference does ***not*** somehow attempt to reconstruct the filter parameters directly from the filtered audio signals. As such, the filter parameters are ***not*** reported to the "measuring

and evaluation unit" by the hearing aid described by the ***Arndt*** reference. In fact, as previously explained by the Appellants, the "measuring and evaluation unit" of the ***Arndt*** reference ***computes and reports the filter parameters to the hearing aid*** – exactly the ***opposite*** of the argument advanced by the Office Action. Consequently, Appellants respectfully suggest that the statement regarding transmission of parametric information via the filter outputs of the ***Arndt*** reference is *completely without factual support and is in direct contradiction to the teachings of the* ***Arndt*** *reference*.

In particular, as explained above, col. 3, lines 37-42, of the ***Arndt*** reference teaches that the external computing device (i.e., "measuring and evaluation unit 9") computes the filter parameters and ***transfers them to the filters***. Further, as explained in col. 3, lines 62-67 with respect to Figure 2 of the ***Arndt*** reference:

> "For calculating the filter parameters, ***the signals picked up by the microphones*** 2, 3, are tapped in the signal paths of the microphones 2, 3, preferably after the parameterizable filters 4 and 5, and ***are supplied to the measuring and evaluation unit 9 via a signal path 17***." (emphasis added)

In other words, the ***filtered*** audio output from the filters described by the ***Arndt*** reference is simply transmitted to the external "measuring and evaluation unit 9". Again, in contrast to the position advanced by the Office Action, ***transmission of a filtered audio signal to an external computing device*** as disclosed by the ***Arndt*** reference is simply ***not*** the same as the claimed limitation regarding a microphone array including an addressable memory that stores parametric information that is automatically reported to the external computing device.

Further, in the "*Response to Arguments*" section presented on page 10 of the Final Office Action, the Examiner advances the argument that:

> "...*applicant argued that the current invention includes a memory and the microphone array automatically reads the parametric information from the memory*

> *and reports the parametric information to the external computing device and Arndt fails to show that*. In view of the entire disclosure, Arndt does not teach that the memory has to store multiple set of parametric information. Arndt merely suggests that multiple sets could be stored. Furthermore, *the hearing aid disclosed in Arndt is an automatic device. Once the device is being turn on, it will automatically set the hearing aid to a current configuration based on the parametric information from the memory. This parametric information is also being transferred to the external computing device through 17 and 19*." (emphasis added)

First, as noted above, and as admitted by the Office Action in the above quoted argument, the hearing aid disclosed by the ***Arndt*** reference is an automatic device. "Once the device is being turn on, it will automatically set the hearing aid to a current configuration based on the parametric information from the memory." However, as discussed above, only configuration performed by the hearing aid is to set the filters to the parameters provided by the external "measuring and evaluation unit." In other words, parameters are sent ***into*** the hearing aid from an external device instead of being sent ***from*** the hearing aid to an external device.

Further, in contrast to the argument that "*...parametric information is also being transferred to the external computing device through 17 and 19...*," Appellants have previously explained that the filtered audio signals provided from the hearing aid to the "measuring and evaluation unit" via lines 17 and 19 is simply not parametric information. In fact, the only data sent via lines 17 and 19 are filtered audio signals.

In addition, it is also important to note that in the Advisory Action, the Examiner argues the following:

> "Arndt also teaches that some signal processing of the audio signal captured by the microphone array is performed at an external device. The paths 18, 17 and 19 all directed to an external device 9. The audio signal captured by the microphone array is directly applied to path 18, and the audio signal captured by the microphone

array is indirectly applied to the paths 17 and 19. ***The claims do not state that the information in the memory is being directly report to the external device***. The signal at path 17 or 19 include the filter coefficients because the signal at 17 or 19 is from the filters (4, 5) which are defined by the filter coefficients. If the input to filter 4 is X, and the coefficent is c1. Then the signal at path 17 is a function of both X and c1. So the parametric information, c1, is reported to the external device. It is irrelevant whether the signal is continuously being transmitted to the external device." (emphasis added)

In fact, in direct contrast to the position advanced by the Examiner, claim 1 does "***state that the information in the memory is being directly report to the external device***." In particular, claim 24 specifically recites "***the microphone array automatically reads the parametric information from the addressable memory and reports the parametric information to the external computing device via a computer interface***..." This language is both clear and unambiguous. As such, Appellants do not understand how the Examiner can argue that the parametric information is not directly reported to the external computing device.

With respect to the claimed limitation regarding transmission of the audio signals from the microphone array for processing, the Office Action suggests that Figure 2 of the ***Arndt*** reference "shows that the signals from microphones are transmitted to external computing device to be processed."

However, as carefully explained in each of the Appellants' prior responses, the specific claim limitation is that ***all*** processing of captured audio signals is performed by the external computing device. Appellants explained the advantages of such an array in comparison to one in which some of the audio processing is performed on-board (such as by the filters (4, 5) and the "signal processing unit" (6) of the ***Arndt*** reference which clearly process the captured audio signals before sending them to the "measuring and evaluation unit 9". Further, the Office Action suggested that the in view of the rejection under

In particular, Appellants specifically describe and claim that "...audio signals captured by the microphone array are transmitted from the microphone array to the external computing device via the computer interface..." and that the "...external computing device..." then performs "...all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device."

In contrast, as admitted by the Office Action, the ***Arndt*** reference discloses processing of audio signals ***within*** the hearing aid itself (e.g., filtering of audio signals). Thus, the ***Arndt*** reference simply does not teach the claimed limitation. Another example of the internal audio processing performed by the ***Arndt*** reference include the integral "signal processing unit **6**" of the hearing air (see FIG. 2 and col. 3, lines 50-67 of the ***Arndt*** reference) that processes sound signals recorded by the microphones (2 and 3) for playback via an integral speaker (i.e., "earphone **7**"). Clearly, the hearing aid device disclosed by the ***Arndt*** reference performs ***internal*** audio processing via both the filters and the integral "signal processing unit **6**". As such, the claimed microphone array is not disclosed by the ***Arndt*** reference.

Further, with respect to the issue of whether the claimed microphone array performs ***all*** audio processing of ***captured audio*** using an external computing device, Appellants respectfully suggest that the Office Action has incorrectly characterized the claimed microphone array. In fact, it should be clear that the external computing device ***does*** perform ***all*** audio processing of the audio signal captured by the microphone array, as disclosed and claimed by the Appellants.

In particular, as discussed above with respect to the rejections advanced by the Office Action under 35 U.S.C. §112, first paragraph, the claimed microphone array ***does pass or transmit all audio data captured by the microphone array to an external computing device for all audio processing of the captured audio data***. For example, paragraph [0048] of the specification (US Patent Application Publication No. 2005-0175190 A1 (US Application No. 10/775,371)), describes this feature of the claimed microphone array as follows:

> "[0048] Consequently, because the ***self-descriptive microphone array makes use of external computing power, rather than including onboard audio processing hardware and software***, the self-descriptive microphone array is relatively inexpensive to manufacture in comparison to conventional microphone array devices that include onboard audio processing capabilities. Further, because ***external processing power is used for audio processing***, combined applications such as, for example, adaptive beamforming combined with acoustic echo cancellation (AEC) can be easily performed without including expensive audio processing softeare and/or hardware within the array itself. Consequently, one major advantage of moving microphone array audio processing to an external computing device is that it enables conventional conferencing applications... to use microphone arrays such as the self-descriptive microphone array described herein while significantly reducing microphone array costs."

Clearly, in view of paragraph [0048], the present specification does provide support for the use of external processing of ***all*** audio data ***captured*** by the microphone array.

Further, with respect to FIG. 3, the Office Action suggests that based on the connections illustrated in FIG. 3, a person "... skilled in the art would also see that pre-amplifiers and the A/D converters also processed the captured audio signal based on the operational characteristic of the microphone array."

First, Appellants respectfully suggest that the A/D converters illustrated in FIG. 3 are an ***optional*** component (illustrated by the use of broken lines) that is not claimed in either claim 1 or claim 24. Therefore, this element cannot be considered as contributing to the conclusion that audio signals captured by the microphone are provided to an external computing device for all audio processing.

In particular, paragraph [0065] of the present application states that "...any boxes and interconnections between boxes that are ***represented by broken or dashed lines in either FIG. 3 or FIG. 4 represent alternate embodiments of the self-descriptive***

microphone array described herein..." Further, paragraph [0068] of the present application explains that in "...a ***related embodiment***, the array 305 ***further includes*** one or more Analog-to-Digital (A/D) converters 335 for digitizing an analog audio input from each microphone (310 through 325)..." Clearly, since the use of A/D converters is optional, and since such use is not claimed, the A/D converters cannot be considered in the present rejection.

Furthermore, with respect to the conclusion advanced in the Office Action that a person "... skilled in the art would also see that ***pre-amplifiers***... also processed the captured audio signal..." it is important to note that claim 1 recites the following limitation:

> "wherein ***audio signals captured by the microphone array*** are ***transmitted from the microphone array to the external computing device*** via the computer interface, said ***external computing device performing all audio processing of the captured audio signals*** in accordance with the parametric information reported to the external computing device." (emphasis added)

In other words, the "***audio signals captured by the microphone array***" are transmitted to the external computing device which then performs all ***audio processing*** of the captured audio signal. In particular, inherent in the claimed ***audio capture*** process performed by the microphone array, pressure waves impinge upon the microphones ***included in the microphone array***, which respond by generating electrical signals that are amplified by the pre-amplifiers ***included in the microphone array*** to produce a ***captured audio signal***. Thus, the ***output*** of the microphone array is the ***captured audio signal***. The captured audio signal is then transmitted to the external computing device where ***all*** audio processing of that audio signal is performed.

Further, note that Appellants specifically claim "...***external computing device performing all audio processing of the captured audio signals***..." Thus, the audio processing being claimed is clearly ***subsequent to the capture process*** performed by the Microphone array, since that audio processing is performed on the ***captured*** audio signal.

As noted above, support for this embodiment of the claimed microphone array is provided in paragraph [0048] of the present application. Therefore, the argument advanced by the Office Action that pre-amplification inherent in the audio signal capture process precludes the ability to perform ***all*** audio processing using an external computing device is without support and must be withdrawn.

Therefore, in view of the preceding discussion, it is clear that independent claim 24 has elements not disclosed in the ***Arndt*** reference. Consequently, the rejection of claim 24 under 35 USC §102(e) is not proper. Therefore, Appellants respectfully traverse the rejection of claim 24, 26, 27, 29 and 30, under 35 USC §102(e) in view of the language of claim 24. In particular, claim 24 recites the following novel language:

> "A system for automatically ***providing device configuration information of a microphone array to an external computing device***, comprising:
>
> a microphone array including at least one microphone, each microphone having a predetermined position in a three-dimensional space relative to the microphone array;
>
> said microphone array further including at least one addressable memory, said addressable memory storing parametric information detailing device configuration information of the microphone array;
>
> wherein the microphone array automatically reads the parametric information from the addressable memory and ***reports the parametric information to the external computing device*** via a computer interface, said external computing device being remotely coupled to the microphone array via the computer interface; and
>
> wherein ***audio signals captured by the microphone array are transmitted from the microphone array to the external computing device*** via the computer interface, said ***external computing device performing all audio processing of the captured audio signals in***

accordance with the parametric information reported to the external computing device." (emphasis added)

VIII. CLAIMS APPENDIX

The claims listed below provide a complete copy of all claims involved in the Appeal:

Listing of Claims:

1 (Previously Presented). A microphone array, comprising:

an array of at least one microphone;

a memory contained within the array, said memory including parametric information which defines operational characteristics and configuration of the array;

an array interface for connecting the array to an external computing device;

wherein the parametric information included in the memory is reported to the external computing device via the array interface upon connection of the array to the external computing device; and

wherein audio signals captured by the microphone array are transmitted from the microphone array to the external computing device via the array interface, said external computing device performing all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device.

2 (Original). The microphone array of claim 1 wherein the memory is a rewritable-type memory.

3 (Original). The microphone array of claim 2 wherein the array further comprises a self-calibration system for automatically evaluating the parametric information which defines operational characteristics and configuration of the microphone array.

4 (Original). The microphone array of claim 3 wherein the parametric information is automatically updated to reflect a current configuration state of the array as identified by automatically evaluating the parametric information which defines operational characteristics and configuration of the microphone array.

5 (Original). The microphone array of claim 3 wherein each microphone in the array further includes an associated preamplifier, and wherein the self-calibration system automatically determines gain of each microphone and associated preamplifier in the microphone array.

6 (Original). The microphone array of claim 1 further comprising a set of at least one speaker, and wherein parametric information which defines operational characteristics and configuration of each speaker is included in the memory contained within the microphone array.

7 (Original). The microphone array of claim 1 wherein the parametric information included within the memory contained within the microphone array includes information defining audio capture characteristics of the microphone array.

8 (Original). The microphone array of claim 1 wherein the array interface for connecting the microphone array to the external computing device is any of a wired and a wireless computer interface.

9 (Original). The microphone array of claim 1 further comprising one or more preamplifiers and one or more analog-to-digital (A/D) converters, said preamplifiers being used to preamplify analog signals captured by each microphone in the array, and said A/D converters being used to convert each preamplified analog audio signal to create a digital audio signal from each analog audio signal.

10 (Original). The microphone array of claim 3 wherein the self calibration system operates automatically for evaluating the parametric information which defines operational

characteristics and configuration of the array as soon as the array is connected to the external computing device via the array interface.

11 (Original). The microphone array of claim 3 wherein the self calibration system operates automatically for evaluating the parametric information which defines operational characteristics and configuration of the array upon a user calibration request transmitted to the microphone array from the external computing device via the array interface.

12 (Original). The microphone array of claim 3 wherein the self calibration system operates automatically for evaluating the parametric information which defines operational characteristics and configuration of the array upon an external calibration request transmitted to the microphone array from the external computing device via the array interface, said external calibration request being generated by audio processing software residing within the external computing device.

13 (Original). The microphone array of claim 1 wherein one or more of the microphones comprising the array of at least one microphone are MEMS-type microphones.

14 (Previously Presented). A method for automatically adapting audio processing software for optimally processing audio signals captured by a microphone array, comprising using a computing device to:

automatically configure audio processing software operating within an external computing device to reflect a current configuration of a microphone array;

wherein the automatically configured audio processing software operating within the external computing device is used for processing audio signals captured by the microphone array and transmitted to the external computing device;

said microphone array including at least one microphone, and said microphone array being coupled to the external computing device via any of a wired and a wireless computer interface;

wherein the microphone array automatically determines the current configuration upon being coupled to the external computing device via the computer interface; and

wherein the microphone array automatically reports the current configuration to the external computing device via the computer interface after the microphone array automatically determines the current configuration.

15 (Original). The method of claim 14 wherein automatically determining the current configuration comprises automatically determining magnitude and phase gains for each microphone in the microphone array.

16 (Original). The method of claim 14 wherein the current configuration of the microphone array is stored locally within the microphone array within a microphone array memory.

17 (Original). The method of claim 16 wherein the microphone array memory is a programmable memory, and wherein the current configuration is stored within the programmable memory in an addressable lookup table.

18 (Original). The method of claim 17 wherein the current configuration stored within the addressable lookup table includes information defining audio capture characteristics for each microphone in the microphone array.

19 (Original). The method of claim 14 wherein the microphone array further provides a separate audio signal for each microphone in the microphone array to the external computing device via the computer interface.

20 (Original). The method of claim 19 wherein each separate audio signal provided to the external computing device is a digital audio signal, and wherein the microphone array includes one or more preamplifiers and one or more analog-to-digital (A/D) converters, said preamplifiers being used to preamplify analog signals captured by each microphone in the microphone array, and said A/D converters being used to convert each preamplified analog audio signal to create each digital audio signal.

21 (Original). The method of claim 14 wherein the microphone array automatically determines the current configuration upon a manual user calibration request transmitted to the microphone array from the external computing device via the computer interface.

22 (Original). The method of claim 14 wherein the microphone array automatically determines the current configuration upon an external calibration request transmitted to the microphone array from the external computing device via the computer interface, said external calibration request being generated by the audio processing software operating within the external computing device.

23 (Original). The method of claim 14 wherein at least one of the microphones included in the microphone array are MEMS microphones, each said MEMS microphone comprising an integrated circuit including one or more microphones, preamplifiers and A/D converters.

24 (Previously Presented). A system for automatically providing device configuration information of a microphone array to an external computing device, comprising:

a microphone array including at least one microphone, each microphone having a predetermined position in a three-dimensional space relative to the microphone array;

said microphone array further including at least one addressable memory, said addressable memory storing parametric information detailing device configuration information of the microphone array;

wherein the microphone array automatically reads the parametric information from the addressable memory and reports the parametric information to the external computing device via a computer interface, said external computing device being remotely coupled to the microphone array via the computer interface; and

wherein audio signals captured by the microphone array are transmitted from the microphone array to the external computing device via the computer interface, said external computing device performing all audio processing of the captured audio signals in accordance with the parametric information reported to the external computing device.

25 (Original). The system of claim 24 wherein the microphone array further includes an automatic self-calibration circuit for automatically determining the parametric information detailing the device configuration information of the microphone array.

26 (Original). The system of claim 24 wherein the at least one addressable memory is automatically updated by the microphone array to include the automatically determined parametric information detailing the device configuration information of the microphone array.

27 (Original). The system of claim 24 wherein the parametric information stored within the at least one addressable memory includes audio capture characteristics for each microphone in the microphone array.

28 (Original). The system of claim 24 wherein the microphone array further includes a set of at least one speaker for reproducing one or more audio signals, and wherein the parametric information detailing the device configuration information of the microphone array further includes audio playback characteristics of each speaker included in the microphone array.

29 (Original). The system of claim 24 wherein the computer interface is any of a wired and a wireless computer interface.

30 (Original). The system of claim 24 further comprising automatically configuring audio processing software operating within the external computing device to reflect the parametric information reported to the external computing device via the computer interface for optimally processing one or more audio signals acquired by the at least one microphone of the microphone array, said audio signals being provided to the external computing device from the microphone array via the computer interface.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

None

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